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BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

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CEREAL DISEASES

DUST DISINFECTANTS FOR CEREAL SEED TREATMENT[1]

Dust seed disinfectants for treating cereals are becoming increasingly popular in the United States. Some of them such as copper carbonate have come into general use but others are only just being introduced or are in the experimental stage. In the case of the dusts mentioned below, except formaldehyde dust, certain principles must be observed. In general seed should be thoroughly cleaned before treatment. The dust and grain should be well mixed in a tight mixing machine -- not merely shoveled over on the floor. The dusts are poisonous (except sulphur) and so a mask should be worn over the nose and mouth when treating. Treated grain should not be used as food or for feeding animals.

Copper carbonate dust has now largely replaced liquids in the control of stinking smut of wheat (Tilletia tritici and T. laevis) in the United States. It also is the most satisfactory seed disinfectant for flag smut of wheat (Urocystis tritici) and stem smut of rye (Urocystis occulta), and controls covered kernel smut of sorghum (Sphacelotheca sorghi). A finely ground copper carbonate is necessary for effective disinfection. The product containing 50 per cent copper is used at the rate of 2 to 2 1/2 ounces and that containing 20 per cent copper is used at the rate of 3 to 4 ounces per bushel. (U. S. Dept. Agr. Misc. Circ. 108. 1928, Farmers' Bulletin 1540. 1927, and Leaflet 33. 1929).

Formaldehyde dust prepared by mixing formaldehyde with infusorial earth, has given excellent control in the two smuts of oats (Ustilago avenae and U. levis) in experiments and tests at the Ohio Experiment Station. A 5 per cent formaldehyde dust used at the rate of about 3 ounces per bushel is most effective. The treatment need not be in a closed container but the grain should be

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1 Note: The above statement was prepared for the International Institute of Agriculture which is assembling information on the present status of dusts as cereal seed disinfectants in the different countries.

left in sacks for several hours before sowing. Although this dust has not come into general use as yet it has possibilities of gradually replacing the spray and liquid formaldehyde treatments that are now in use. (Phytopath. 19: 102-103. Jan. 1929).

Sulphur dust at the rate of 2 ounces per bushel gives satisfactory control of the covered kernel smut of sorghum, finely ground sulphur being better than the flowers of sulphur. It is as effective as the copper carbonate and not so expensive. (Kansas Agr. Exp. Sta. Tech. Bull. 22. 1928).

Ethyl mercury chloride sold in the United States under the trade name Ceresan has given satisfactory results in controlling stinking smut of wheat, covered smut (Ustilago hordei) and stripe (Helminthosporium gramineum) of barley, loose smut of Tennessee winter barley (Ustilago nuda), the smuts of oats, and covered kernel smut of sorghum. (Phytopath. 19: 80. 1929).

Other commercial dust disinfectants have been found effective for controling certain cereal diseases. Leukel (Phytopath. 19: 81. 1929) and Leukel, Dickson, and Johnson (Phytopath. 19: 81. 1929) found that Abavit B, Trockenbeize Tillantin, and Wa Wa gave control of covered smut of barley in their tests, reduced loose smut in barley from 0.7 per cent to a slight trace, and gave perfect control of stinking smut of wheat. Other commercial dusts which controlled stinking smut of wheat without seed injury were Vitrioline, S.F.A. 225 and 225V, Dupont 68, and Ceresan. Stripe of barley was practically eliminated in every trial with Ceresan, Trockenbeize Tillantin, and Wa Wa. Holbert (U. S. Dept. Agr. Circ. 34. 1928) has reported increased yields of maize through seed treatment with the mercury dusts -- Improved Semesan Jr., Merko and Bayer Dust used at the rate of 2 ounces per bushel. These disinfectants are primarily to kill certain seed-borne pathogens which cause ear and root rots, principally Diplodia, Gibberella and Basisporium. Treated seed cannot always be expected to give increased yields as effectiveness depends upon many factors such as degree and kind of seed infestation, variety of maize, weather and soil conditions. (R. J. Haskell, Nov. 16)

SEED TREATMENT TESTS WITH WINTER OATS

In the fall of 1928, seed treatment tests were undertaken with oats, in which both naturally and artificially heavily smutted grain was sown (on the College Farm, Raleigh, North Carolina). Each treatment included a total of 21 replications, which were made up of several series each of which was sown on a different date. A summary of the results is given in the following table:

Treatment	Percentage of Smutted Heads				
	Artificially Smutted			Naturally Smutted	
	Date Planted				
	Oct. 27	Nov. 8	Nov. 30	Oct. 27	Nov. 8
Untreated check	43.7	39.2	7.0	43.9	38.6
Formaldehyde spray	0.0	0.2	0.0	0.0	0.0
Smuttox	0.0	0.0	0.0	0.0	0.0
P-M-A	0.9	0.0	0.0	0.3	0.0
Ceresan	0.3	0.1	0.0	2.5	1.1
Mercuric chloride	0.1	0.0	0.0	0.4	0.4
Copper carbonate	28.6	14.7	2.9	21.0	21.7

Treatment	Percentage of Smutted Heads				
	Artificially Smutted			Naturally Smutted	
	Date Planted				
	Oct. 27	Nov. 8	Nov. 30	Oct. 27	Nov. 8
(Copper carbonate 1 part (Mercuric chloride 2 parts	0.0	0.0	0.0	5.2	2.3
Copper sulfate	11.1	2.7	0.0	22.0	22.6
(Copper sulfate 1 part (Mercuric chloride 2 parts	0.1	0.0	0.0	0.6	1.0
Monohydrated copper sulfate	43.6	25.4	12.5	32.1	24.5
Iodine dust	41.9	36.2	19.8	31.8	29.1

The above results, which were obtained from smut counts in the spring of 1929, gave the writers the impression that at least two of the commercial dusts, namely, Smuttox and Ceresan gave what might be termed practical or reasonable control of oat smut. Also as it will be noted combinations of mercuric chloride with copper carbonate and copper sulfate gave very good control. On the other hand copper carbonate and copper sulfate which have at times been recommended for the prevention of oat smut gave very poor control, in spite of the effectiveness of these materials in preventing wheat smut. The grain for the various plots referred to above, with the exception of the formaldehyde plots, received treatment at the rate of 3 ounces per bushel of finely powdered dust. (G. W. Fant and S. G. Lehman, Nov. 13)

SMUTS OF CEREAL CROPS IN VIRGINIA

James Godkin has sent in the following report (Nov. 15).

WHEAT

It is a little early to give you a complete report on the various phases of the copper carbonate, Ceresan and Smuttox dusts and their control of the cereal smuts. I believe copper carbonate is becoming more popular each year, although in some few sections of the state there has been a let-down in its use in spite of the fact that we are and have been urging its continued use. Millers, county agents, and agricultural high school instructors have been cooperating splendidly on this proposition. Probably as much copper carbonate dust was used in 1929 as in 1928.

Some of our leading seedsmen of the state have installed treating machines at our suggestion and advice. Possibly 20,000 bushels of wheat, oats and barley will be treated for growers of the state in this way during the present fall. Ceresan is being recommended for barley and oats. A great deal of time has been given by this Department toward popularizing the dust treatments especially for barley and oats.

Field men of the Virginia Crop Improvement Association inspected 74 crops of wheat totalling 1,906 acres and loose smut ran from a trace to 2 per cent. Nine fields showed from 1.5 per cent to 2 per cent of loose smut. Twenty-five other wheat fields were examined by this Department and ran from 1 to 2 per cent of loose smut.

OATS

Ten fields totaling 75 acres showed from 1.5 to 8 per cent smut in three fields. Smuttox gave excellent control in Albemarle County.

BARLEY

Five fields totaling 100 acres. Covered smut was more prevalent than the loose. In one field of 5 acres both smuts totaled 60 per cent. Covered smut averaged 6 per cent for all fields and loose smut 2.5 per cent.

Ceresan has given good control for covered smut in Charlotte County. Several demonstrations are under way this fall with Tennessee-Winter barley using Ceresan as a control for both smuts.

SOME PRELIMINARY ESTIMATES OF LOSSES FROM STEM RUST (PUCCINIA GRAMINIS) OF CEREALS IN NINE OF THE THIRTEEN BARBERRY ERADICATION STATES, 1929.

State	Reporter	Percentage Reduction in Yield from Stem Rust			
		Wheat	Oats	Barley	Rye
Ohio	J. W. Baringer	1.5	t	1.5	t
Indiana	W. E. Leer	t	0	0	0
Illinois	R. W. Bills	0.5	0.7	0	0
Michigan	W. F. Reddy	t	t	t	t
Wisconsin	R. M. Caldwell	8.3* t°	6.7	2.5	t
Minnesota	L. W. Melander	13.7	4.7	2.0	0
Nebraska	B. F. Dittus	t	t	t	t
Wyoming	W. L. Popham	t	0	0	0
Montana	W. L. Popham	t	t	0	0

*Spring wheat
°Winter wheat

FRUIT DISEASES

PHONY PEACH QUARANTINE MODIFIED

An announcement in The Official Record for November 14, page 5, states that the phony peach disease quarantine has been amended by the Secretary effective November 1. The principal modification is the addition of 19 Georgia counties and six Alabama counties to the area previously brought under regulation on account of the disease. The new infections, in northern Georgia and northeastern Alabama, were found by inspectors of the Bureau of Plant Industry engaged in eradication work.

Intensive eradication work was started in the northern and northwestern parts of Georgia with the intention of completely eliminating the disease from

the outlying areas of infection at the earliest possible date and extending the work eventually to the old centers of infection in the State in and surrounding Peach, Bibb, Macon, and Houston Counties.

The work thus far has included a substantially complete survey of the commercial orchards in the counties named in the new amendment and many adjoining counties, and it reveals only a small number of recent infections in these districts. The infected trees discovered have been or are being destroyed. The Bureau plans to continue the eradication work, first, by broadening the surveys to cover dooryard and roadside peach trees, and second, by extending the territory inward toward the center of infection as the work progresses.

The plant quarantine and control administration, in cooperation with the Georgia and Alabama State departments of agriculture, is undertaking to prevent the spread of the disease to outside points by restrictions on the shipment of nursery stock. In order to protect the zone in which the infection is slight and where intensive eradication operations are in progress, the regulated areas are divided into two sections, known as the "generally infected area" and the "lightly infected area" respectively.

The movement of peach nursery stock and other restricted articles from either area to outside points and from the "generally infected area" to the "lightly infected area" is prohibited except under permit. It is the expectation that as the surveys continue and the intensive eradication operations are undertaken closer to the center of infection, the lightly infected area can gradually be expanded to include the counties in which substantial progress is being made toward eradication.

The "generally infected area" under the amendment consists of Lee and Chambers Counties in Alabama, and a large district in central Georgia extending from Fulton and Jackson Counties on the north to Quitman, Mitchell, and Laurens Counties on the south. Except for the addition of Chambers County in Alabama and Warren and McDuffie Counties in Georgia, it is the area which has been under regulation heretofore. The "lightly infected area" under the new amendment includes the following counties: Calhoun, Cherokee, Cleburne, DeKalb, and Tuscaloosa, in Alabama; and Banks, Bartow, Campbell, Carroll, Chattooga, Cherokee, Cobb, Dade, Douglas, Floyd, Habersham, Heralson, Heard, Milton, Paulding, Polk, Walker, and Whitefield, in Georgia. These counties, except Chattooga, are now under regulation for the first time.

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DISEASES OF TREES

WITCHES' BROOM OF LOCUST

This statement concerning the occurrence of witches' broom of locust in Pennsylvania is by W. A. McCubbin, Chief Plant Pathologist of Pennsylvania. Witches' broom has been found in the following localities in Pennsylvania:

(1) Paxtang in Dauphin County, about 1923 on a large tree since removed in building operations.

(2) Terminals of small shrubs 6 to 8 feet high, near New Cumberland in York County about 1925.

(3) Noted in Lancaster County in 1927 and found in the same locality in 1929 (Vogel orchard, 3 miles north of Lancaster). A small tree with several branches affected.

(4) Near Oberlin in Dauphin County, October 3, 1929.

(5) On road between Mt. Holly Springs and Hunters Run in Cumberland County, October 6, 1929.

(6) Near Quincy, Franklin County, October 23, 1929.

(7) South boundary of Mont Alto, October 23, 1929.

(8) One mile south of Fayetteville in Franklin County, October 23, 1929.

(9) Near Marysville, Perry County, October 10, 1929.

(10) Report by C. S. Anderson outskirts of Harrisburg, September 2, 1929. Specimens verified.

(11) F. L. Holdridge reports this trouble from the edge of a swamp near Quarryville, June 1926. No specimens but Mr. Holdridge knows this trouble from my specimens.

I have no doubt that this disease is fairly common as the above records will indicate. I am wondering about its relationship since it appears on young trees as a type of second growth in fall after the normal growth has ceased. In several of these cases it would seem that it follows injury by a twig borer on the smaller branches and the case of which I am sending you a specimen from Quincy after the young growth had been cut off close to the ground with a scythe.

RECENT NOTES ON CHESTNUT BLIGHT IN OREGON

On August 16, 1929, Dr. Haven Metcalf advised the Oregon Experiment Station that a specimen of undoubted chestnut blight had been received by the Office of Forest Pathology having been forwarded indirectly from the place of J. O. Gunter of Gunter, Oregon.

Through the courtesy of the Office of Blister Rust Control, L. N. Goodding, experienced plant disease scout with headquarters at the Oregon Station, was detailed to investigate the situation. August 22-24 he visited the little out-of-the-way post office of Gunter in the hills of northern

Douglas County. He found on the place of J. O. Gunter the diseased stump of a Paragon chestnut tree that had been cut down after severe damage by the chestnut blight fungus which Goodding found fruiting on the stump. This tree had been received from Pennsylvania about 1916.

A Spanish chestnut tree of about the same age with a foot-thick trunk standing on the same place showed serious damage from the same disease.

Close observations revealed no further indications of the disease on the place in the neighborhood. Western chinquapin (Castanopsis chrysophylla) only 200 yards away and others in the vicinity showed no indications of this disease although thorough search was made. None was found on nearby oaks nor on a few trees of American, Japanese and Colossal (seedling) chestnuts which had been planted on the place at various times.

Later C. E. Stewart, experienced fruit inspector of Lane county, J. R. Parker, fruit inspector of Douglas county, and Howard Morriam State Horticultural Commissioner, visited the locality, made thorough search and found everything free from signs of attack except the two trees found diseased by Goodding.

These two trees were completely destroyed by cutting down and burning soon after. The owner, Mr. J. O. Gunter, showed a fine spirit and did everything possible to aid in the investigation and eradication of the disease. The place will be kept under continued observation. There are no other known plantings of chestnuts within twenty miles of Gunter.

(H. P. Barss, Nov. 11).

ROOT KNOT ON MAPLE

About a hundred yards away from a greenhouse at Eugene, Oregon which contained Jerusalem cherry, fuchsia, geranium, wandering Jew, Burbank spineless cactus, and yucca plants infested with root knot nematodes (Caconema radicicola) stood an Oregon or broad leaf maple (Acer macrophyllum) tree. Investigations by C. E. Stewart, County Fruit Inspector of Lane County, showed the roots of this tree to be abundantly infested with root knot nematode. A microscopic examination revealed the presence of enlarged females in the gall tissues. This appears to be the first record of Caconema radicicola infesting the maple. (H. P. Barss, Nov. 21).

MISCELLANEOUS HOSTS

YELLOWS (VIRUS) ON VARIOUS PLANTS

G. L. Zundel reports the observation of yellows believed to be due to the aster yellows virus on calendulas, salsify, parsnips, and carrots, all on the same farm in Cumberland County, Pennsylvania, (November 13).

SPECIMENS RECEIVED

Botryosphaeria ribis Gross and Dugg. on Populus sp. (Chinese Lombardy poplar). Piggott, Arkansas, November. Received from V. H. Young. Determined by G. Hamilton Martin. First report to the Plant Disease Survey from this state.

Cacosmea radicicola (Greef) Cobb, root knot on Iris sp. Fayetteville, Arkansas, November 19. Collected and determined by V. H. Young. First report to the Plant Disease Survey for this state.

Coccomyces kerriae V. B. Stewart, twig and leaf blight on Kerria japonica, Harrisburg, Pennsylvania, November. Collected and determined by W. A. McCubbin.

CORRECTIONS

On page 167 of the preceding issue of the Reporter (November 15), the report of Phomopsis sp. on seedlings of Castanea sp. should read from Round Hill, Virginia, instead of Round Hill, Pennsylvania.

Also on page 167, under Botry sphaeria ribis on Salix sp., the last sentence should read: "First report to the Plant Disease Survey from this state" (i.e. Georgia) instead of from Ohio state.